REMARKS

This Amendment is in response to an Office Action having a mailing date of July 12, 2002. Claims 1-23 are pending in the present Application. Applicant has amended claims 1, 10 and 17. Consequently, claims 1-23 remain pending in the present Application.

Applicant has added Figures 7A-7C and amended the specification to include a description of Figures 7A-7C. Support for the amendment can be found in the specification, page 12, line 8-page 13, line 9, which describes the operation of the snooper, checker and generator. Accordingly, Applicant respectfully submits that no new matter is added by the additional drawings and amendment to the specification.

Applicant has amended claims 1, 10 and 17 to recite that the checker or the checking step further includes determining the desired output based upon an input to the island. Support for the amendment can be found in the specification, page 12, lines 18-20. Applicant has also amended the claims to recite that the generator provides the inputs based upon a request for service and data provided by the test case. Applicant has also amended claims 10 and 17 to ensure that the terms have proper antecedent basis. Applicant respectfully submits that these amendments to claim 10 and 17 do not narrow the scope of claims 10 and 17. Applicant also respectfully submits that no new matter is added.

In the above-identified Office Action, the Examiner indicated that:

> [t]he subject matter of this application admits of illustration by a drawing to facilitate the understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing. Specifically, applicants have claimed a 'snooper', 'generator', 'interface', and 'checker' process that has not been adequately represented in **figures** or text. While figures 4a and 4b do incorporate these function as a 'block, each process needs to be represented by a functional flow chart in order to clarify the inventions operation.

Applicant notes that the snooper, checker and generator are depicted in Figure 3 and described in the specification, page 11, line 7-page 14, line 4. In the description, it is indicated that

at least in one embodiment, the snooper, checker and generator are software. Specification, page 11, lines 20-23. Applicant has also provided Figures 7A, 7B, and 7C, which are flow charts depicting the functions of the snooper, checker and generator, respectively. The subject matter of the flow charts of Figures 7A-7C is also described in the specification, page 12, line 8-page 13, line 9. Thus, the snooper monitors the interface of the island for inputs and outputs, and provides certain outputs and inputs to the checker. The checker may generate the desired outputs for given inputs and checks the actual outputs from the interface against the desired inputs. The generator uses the instructions provided by the test case and, in some cases, the outputs to provide the inputs to the interface.

Applicant respectfully disagrees that the claimed interface requires a flow chart or any additional explanation. As described in the specification, signals are input to or output from the representation of the IC via the interface. Specification, page 2, lines 2-5 and page 7, lines 2-5. In addition, as discussed in the BACKGROUND OF THE INVENTION, the interfaces are already present in the integrated circuits of the prior art. Specification, page 2, lines 1-5. As is also described in the specification, the IC is typically represented using code during various stages of integration. For example, the IC may be represented in a behavioral language, register transfer level and gates during simulation. Specification, page 12, lines 1-4. The IC and thus the interface and islands are thus representations in some type of code. The interface allows the corresponding islands to interact with other pieces of code, such as other islands or the snooper, checker and generator. Specification, page 12, lines 4-7. For example, as described in the Declaration, the interfaces typically include some type of connector and the protocols used to manage the connectors. Thus, Applicant respectfully submits that the snooper, checker and generator are adequately described by the specification and drawings.

Furthermore, what is required is that one of ordinary skill in the art, which includes testing of ASICs, understands the terms, such as interface. As discussed in above, the specification describes the representation of ICs used in simulation and the function of an interface. The term "interface" is not used in a manner different to the art. Instead, use of the term "interface" as a mechanism for an island receiving inputs and providing outputs is consistent with what one of ordinary skill in the art would understand. Moreover, according to the MPEP, "not everything necessary to practice the invention need be disclosed. In fact, what is well-known is best omitted." MPEP 2164.08. It is also accepted that where elements ... and processes, which are conventional and generally widely known in the field to which the invention pertains, form a part of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. Consequently, Applicant respectfully disagrees that the term "interface" requires an additional drawing.

In the above-identified Office Action, the Examiner rejected claims 1-23 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains. The Examiner also rejected claims 1-23 under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,175,946 ("Ly").

In the above-identified Office Action, the Examiner rejected claims 1-23 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains. In particular, the Examiner indicated that the terms snooper, checker, interface, test case and generator are not adequately described.

As discussed above, Applicant has provided additional drawings and descriptions relating to the checker, snooper and generator. In addition, the interface is already present in

conventional integrated circuits and described in the specification. The specification also states that the test case provides a framework of instruction and, in some cases, data to the generator (thus directing the generator). Specification, page 13, lines 2-5 and page 13, line 17-page 14, line 4.

In addition, Applicant has provided herewith a Declaration under 37 C.F.R. 1.132 from one of the inventors, Dr. Raj Singh. As indicated in the Declaration, the snoopers, checkers and generators include sufficient intelligence, or logic in the form of procedures and internal data structure, to perform their functions. For example, based only upon a request to perform a particular simulation and data from a test case, the generator can provide the appropriate inputs to the island under test. Similarly, the checker and snooper can monitor the island for outputs, generate the desired outputs, and check the outputs against the desired outputs without significant input from the test case. In addition, as indicated by the information provided in the Declaration, the functions performed by and outputs checked using the method and system in accordance with the present invention may change based upon the type of integrated circuit being developed. For example, in one embodiment used to check a particular interface of a particular island, the generator can provide ATM cells to the island in response to a request for a test using the ATM cells and data provided by the test case. The snooper and checker would then monitor and check the outputs of the island that are provided based upon the inputs. Other islands and/or other interfaces might be checked using different simulations. However, in each case, the inputs would be generated based at most upon a request for a particular simulation and data provided by the test case. Thus, one of ordinary skill in the art would be able to practice the invention to perform hierarchical testing on islands of specific integrated circuits under test.

Consequently, Applicant respectfully submits that the subject matter of the claims is adequately described in the specification. With the addition of Figures 7A-7C and the

accompanying discussion, Applicant respectfully submits that the specification describes the subject matter of claims 1-23 in such a way as to enable one skilled in the art to which it pertains.

The Examiner also rejected claims 1-23 under 35 U.S.C. § 102 as being anticipated by Ly.

Applicant respectfully traverses the Examiner's rejection. Claim 1 recites a system for providing simulation of an integrated circuit ("IC") during development of the IC. The IC has an island including an interface. The system includes a snooper, a checker, a generator and a test case. The snooper is coupled with the interface, monitors the interface, and obtains an output provided by the island during simulation. The checker determines a desired output based upon an input to the island and checks the output to determine whether the output is the desired output. The generator provides the input to the island during simulation. The generator includes the intelligence to provide the input to the island based only upon data and a request provided by the at least one test case to the generator. The request from the at least one test case requests that the generator perform a particular simulation on the island. Claims 10 and 17 recite analogous method and computer-readable medium claims, respectively.

Thus, using the system, method and computer-readable medium recited in claims 1, 10 and 17, hierarchical simulation of the behavior of the IC is performed. Furthermore, because the function of the checker, snooper and generator are separated, the generator can be replaced by actual portions of the IC (other islands) during integration, while the snooper and checker can remain. Specification, page 13, lines 10-13. As a result, the inputs can be provided by another island of the IC being integrated while the inputs to and outputs of the island via the internal interface can still be checked. Specification, page 13, lines 10-16. In addition, because the snooper, checker and generator can perform the functions recited, the test case(s) need not contain intelligence for controlling specific functions of the snooper, checker and generator. Specification, page 13, lines 7-20. Instead, the test case merely provides a request to perform a

particular simulation and, at least in some instances, data used by the generator in generating the inputs for the particular simulation. Consequently, the test case(s), many of which may be required for testing of the IC, are simpler to provide.

In contrast, Ly describes a single component, a checker, which is used to check certain pre-predicted behavior. In particular, Ly describes that known defective behaviors are predetermined. Ly, col. 3, lines 9-12. Thus, Ly converts a circuit's description into a graph and searches for specific elements that are associated with known defective behavior. Ly, col. 2, lines 44-52. A checker that can monitor for an instance of the known defective behavior is then created. Ly, col. 4, lines 52-55. The checker generates a message each time the "monitored behavior conforms to the known defective behavior." Ly, col. 2, lines 57-59. The known defective behavior is determined by techniques such as manual inspection and the use of errata sheets. Ly, col. 3, lines 9-24. The checker that monitors the behavior for conformance with the "known defective behavior" is given preset behaviors to check for. Ly, col. 3, lines 33-45. Thus, the checker of Ly apparently does not generate the desired behaviors, but relies upon already specified instances of defective behavior. In addition, Applicant notes that Ly contrasts the teachings of Ly with a method which uses test cases to simulate behavior and check a portion of an IC. Ly, col. 3, line 63-col. 4, line 8.

Ly fails to teach or suggest the use of a checker which both determines the desired output of an island based upon the input(s) and checks the output of an island to determine whether a desired output is provided. Instead, the system of Ly uses predefined behaviors and checks the outputs for the predefined behaviors. Consequently, Ly fails to teach or suggest both determining the desired output based on the input(s) and checking the actual output to determine whether the output conforms to the desired behavior.

Furthermore, Ly fails to teach or suggest providing separate components, a snooper, a checker and a generator, for monitoring the interface, checking the outputs and providing the

inputs. Instead, Ly uses a single checker to both monitor the interface and check the output. As a result, Ly is incapable of separately tailoring the monitoring of an interface to the IC and checking the data output by the IC by using different tools (i.e. the snooper and checker). In addition, given that Ly teaches that the system of Ly is an improvement over verifying the behavior of the IC through actual tests, Ly teaches away from actually providing the inputs to the island through a generator or other means.

Moreover, Ly fails to teach or suggest a generator that provides inputs based only upon a request for a particular simulation and data provided by the test case. Applicant can find no mention in Ly of placing the intelligence in the generator required to generate inputs when the test case merely provides a request for service and certain data. Consequently, Ly also fails to teach or suggest the use of the separate recited snoopers, checkers and generators. Accordingly, for the above-mentioned reasons, Ly fails to teach or suggest the system, method and computer-readable medium recited in independent claims 1, 10 and 17.

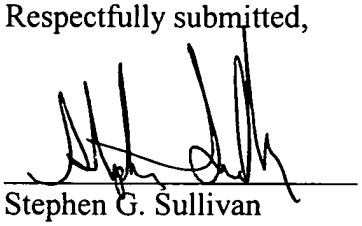
Claims 2-9, 11-16 and 18-23 depend upon claims 1, 10 and 17, respectively. Consequently, the arguments herein apply with full force to claims 2-9, 11-16 and 18-23. Accordingly, Applicant respectfully submits that claims 2-9, 11-16 and 18-23 are allowable over the cited references.

Accordingly, for the above-mentioned reasons, Applicant respectfully submits that the claims are allowable over the cited reference. Consequently, Applicant respectfully requests reconsideration and allowance of the claims as currently presented.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made"**.

Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issue remain, the Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,



Stephen G. Sullivan
Sawyer Law Group LLP
Attorney for Applicant(s)
Reg. No. 38,329
(650) 493-4540

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 9, line 4, please insert:

Figure 7A is a flow chart depicting one embodiment of a method in accordance with the present invention performed by one embodiment of a snooper in accordance with the present invention.

Figure 7B is a flow chart depicting one embodiment of a method in accordance with the present invention performed by one embodiment of a checker in accordance with the present invention.

Figure 7C is a flow chart depicting one embodiment of a method in accordance with the present invention performed by one embodiment of a generator in accordance with the present invention.

Page 14, after line 4, please insert

Figure 7A is a flow chart depicting one embodiment of a method 300 in accordance with the present invention performed by one embodiment of a snooper 102 in accordance with the present invention. For clarity, the method 300 is described in conjunction with the interface 24 of the island 16. Thus, it is assumed that the snooper 102 is coupled with the interface 24 of the island 16. The snooper 102 monitors the interface 24, via step 302. It is determined whether an input and/or output have been detected, via step 304. If an output is not detected, then the interface 24 is continued to be monitored, in step 302. However, if an input and/or output are detected, then the input and/or output may be provided to the checker 104, via step 306.

Figure 7B is a flow chart depicting one embodiment of a method 310 in accordance with the present invention performed by one embodiment of a checker 104 in accordance with the present

invention. For clarity, the method 310 is described in conjunction with the interface 24 of the island 16. Thus, it is assumed that the checker 104 is coupled with the interface 24 of the island 16, preferably through the snooper 102. The checker 104 can, in some embodiments, generate the desired output(s) based upon the input(s), via step 312. The input(s) used in step 312 are provided by the snooper 102. However, in an alternate embodiment, the checker 104 can be provided with the desired output(s). The checker 104 checks the actual output(s) from the interface 24, and provided by the snooper 102, against the desired output(s), via step 314. Thus, the checker 104 checks the output(s) for errors in step 314. The checker 104 can then output a message indicating whether there are errors in the output, via step 316. Thus, the checker 104 checks the output(s) from the interface 24 that are provided by the snooper 102 to determine whether the island 16 being tested is operating properly.

Figure 7C is a flow chart depicting one embodiment of a method 320 in accordance with the present invention performed by one embodiment of a generator 106 in accordance with the present invention. For clarity, the method 320 is described in conjunction with the interface 24 of the island 16. Thus, it is assumed that the generator 106 is coupled with the interface 24 of the island 16. The generator 106 is also coupled with a test case 107. The generator 106 generates input(s) for the interface 24 using instructions from the test case 107, via step 322. In a preferred embodiment, the generator 106 also introduces some randomness to the input(s) in step 322. The generator 106 may also receive output(s) from the interface 24, via step 324. The output(s) received are based upon the inputs that the generator 106 previously provided. The generator 106 may then generate new input(s), preferably using some randomization, for the interface 24, via step 326. The method 320 can thus be repeated until sufficient testing of the island 16 has been performed.

IN THE CLAIMS:

1. (Amended) A system for providing simulation of an integrated circuit during development of the integrated circuit, the integrated circuit having an island including an interface, the system comprising:

a snooper coupled with the interface for monitoring the interface and obtaining an output provided by the island during simulation;

a checker, coupled with the interface, for checking the output to determine whether the output is a desired output;

a generator coupled with the island for providing an input to the island during simulation; and

at least one test case coupled with the generator for directing the generator;

wherein the checker further determines the desired output based upon the input; and

wherein the generator further includes intelligence to provide the input to the island based only upon data and a request provided by the at least one test case to the generator, the request requesting that the generator perform a particular simulation on the island.

10. (Amended) A method for providing simulation of an integrated circuit during development of the integrated circuit, the integrated circuit having an island including an interface, the method comprising the steps of:

(a) [snooping]monitoring the interface to obtain an output provided by the island during simulation;

(b) checking the output to determine whether the output is a desired output, the checking step (b) further including the step of

(b1) determining the desired output based upon an input;

(c) providing [an]the input to the island during simulation; and

(d) directing the providing of the input using at least one test case;

wherein the input is provided to the island using a generator including intelligence to provide the input to the island based only upon data and a request provided by the at least one test case to the generator, the request requesting that the generator perform a particular simulation on the island.

17. (Amended) A computer-readable medium having a program for providing simulation of an integrated circuit during development of the integrated circuit, the integrated circuit having an island including an interface, the program comprising instructions for:

(a) [snooping]monitoring the interface to obtain an output provided by the island during simulation;

(b) checking the output to determine whether the output is a desired output, the checking step (b) further including the step of

(b1) determining the desired output based upon an input;

(c) providing [an]the input to the island during simulation; and

(d) directing the providing of the input using at least one test case;

wherein the input is provided to the island using a generator including intelligence to provide the input to the island based only upon data and a request provided by the at least one test case to the generator, the request requesting that the generator perform a particular simulation on the island.